

# Public Works

## Engineering & Construction Services Division

# Materials Testing Laboratory

Gary M. Fones, P.E.  
*Technical Manager*

Ensuring Quality Projects  
Capital Project Forum 5/25/05





**1661 Senter Road, Bldg. A, 1<sup>st</sup> Floor  
San Jose, CA 95112  
(408) 998-6015**



# Our Mission:

Mission San José



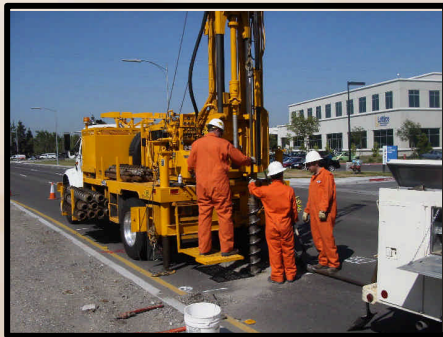
***“To Deliver Excellent, Timely,  
and Cost Effective Materials  
Engineering Services”***

# Scope of Services

# Strategic Support Role for Projects

## Design Phase

- Plan and specification review
- Pavement design, overlay assessment, and failure analysis
- Exploratory soil borings
- Alternative material proposals
- Cost estimates for testing and design services



## Construction Phase

- Materials submittal review
- Materials testing and inspection for:
  - Relative Compaction
  - Hot Mix Asphalt
  - Portland Cement Concrete
  - Slurry/Chip Seals
  - Quarry Products
  - Cement/Lime Treated Base
- Reinforced Concrete Pipe certification





# Testing and Inspection Services

- Hot Mix Asphalt (HMA) Testing
- Portland Cement Concrete Testing
- Quarry Products Testing
- Treated Base Testing (LTB, CTB, Soil Cement)
- Compaction Testing of HMA, Soils, and Aggregates
- Inspection of Reinforced Concrete Pipe (36" or greater)



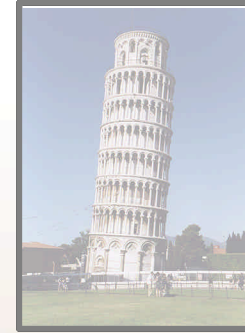
# Engineering Services

- Review of Plans and Specifications
- Review of Materials Submittals
- Geotechnical Services
  - Pavement Design
  - Log of Boring
  - Soil Classification (USCS)
  - Lime & Cement Treated Base Design



# Services Not Provided

- Soils Reports for Buildings
- Hazardous Materials Investigations
- Environmental Engineering Services





# Why Is Testing Necessary?

# Quality Assurance

- Safeguard the public and prevent large-scale failures.
- Quality assurance guarantees that “You get what you pay for.”
- Lower life-cycle costs on the City’s infrastructure investments.
- Litigation and claims avoidance.
- Failure analysis testing can be ten times the cost of initial testing.



# Our Motto:

## “One Test is Worth 1,000 Expert Opinions!”



The Tropicana Parking Structure in Atlantic City collapsed while under construction in 2003, killing four workers and injuring 20. OSHA's investigation concluded that numerous safety violations contributed to the collapse. These violations included inadequate formwork, multiple shoring deficiencies, and a **lack of concrete testing**.

# On Time, On Budget

# MTL Services Save Time and Money

- MTL staff can begin work the next day with a valid charge number, versus a 2-3 month delay to contract a private testing firm.
- Service costs are often significantly less than those of private laboratories.
- The MTL provides fully accredited and timely test results.





# Accreditation and Certification

## National Voluntary Laboratory Accreditation Program



National Institute of Standards and  
Technology



U.S. Department of  
Commerce

## Nationally Recognized Test Procedures



Caltrans



American Association of Highway  
Transportation Officials



American Society for Testing and  
Materials



American Concrete  
Institute

## Experienced, Certified Personnel



American Concrete  
Institute



National Institute for Certification  
in Engineering Technologies



International Code Council



State of California  
Registered Professional Engineers

# Private Labs vs. MTL Cost Comparison

Test	Kleinfelder	Earth Systems	DCI	Terrasearch	Consolidated Engineering	MTL	Avg. Savings
Sieve Analysis (Fine)	\$98	N/A	\$140	\$120	\$105	<b>\$65</b>	<b>43%</b>
Compressive Strength of PCC Cylinders (2 cylinders)	\$48	\$60	\$42	\$46	\$52	<b>\$30</b>	<b>40%</b>
Stability and Flow of Asphalt Concrete by Marshall Method (3 Specimens)	\$320	\$359	\$310	N/A	\$495	<b>\$250</b>	<b>33%</b>
Stabilometer Value (3 Specimens)	\$420	\$374	\$310	\$270	\$552	<b>\$250</b>	<b>35%</b>

# Cost Estimates for Materials Testing

The MTL will develop written cost estimates for large projects when requested.

## Estimates Include:

- MTL staff time necessary for quality assurance.
- Citywide overhead charges.
- Contingency of 10% for additional testing and overtime.

## Estimates DO NOT Include:

- Night work or holiday work.
- Testing beyond 10% contingency.

ESTIMATE FOR TESTING AND INSPECTION SERVICES SLURRY PROGRAM APPLICATIONS 2004/05 MATERIALS TESTING LABORATORY						
Prepared By:		Bob Gutierrez			Date:	3/1/2004
Engineers Estimate:		na				
SLURRY SEAL				Quantity:	715,000 SY	
Field Work						
Quantity	Type of Test	Hrs/Trip	# of Employees	Cost/Hour	Total Hours	EXTENSION
12	Sampling Slurry Seal	4	1	\$73.00	48	\$ 3,504
8	Sampling Aggregate (ASTM D75)	4	1	\$73.00	32	\$ 2,336
12	Sampling Emulsion	4	1	\$73.00	48	\$ 3,504
Lab Work						
Quantity	Type of Test				Cost/Unit	EXTENSION
8	Sieve Analysis (CAL 202)				\$100.00	\$ 800
8	Sand Equivalent (CAL 217)				\$100.00	\$ 800
8	Durability Index, Fine (CAL 229)				\$100.00	\$ 800
12	Saybolt Viscosity (AASHTO T-59)				\$300.00	\$ 3,600
12	Residue by Evaporation (CAL 331)				\$390.00	\$ 4,680
12	Penetration (ASTM D5)				\$100.00	\$ 1,200
12	Wet Track Abrasion (ASTM D3910)				\$195.00	\$ 2,340
12	Softening Point (AASHTO T-53)				\$350.00	\$ 4,200
Submittal Review						
Quantity	Type of Test				Cost/Unit	EXTENSION
2	Submittal Review				\$180.00	\$ 360
SUBTOTAL FOR SLURRY SEAL						\$ 28,124
TOTAL WITHOUT CONTINGENCY						\$ 28,124
5% CONTINGENCY						\$ 1,406
5% OVERTIME CONTINGENCY						\$ 1,406
TOTAL WITH CONTINGENCY						\$ 30,936

# Project Cost Tracking

The MTL utilizes a relational management system database to track all labor costs for its projects on a weekly basis.

CITY OF  
**SAN JOSE**  
CAPITAL OF SILICON VALLEY

**City of San José, California**

Materials Testing Laboratory  
1661 Senter Road, Building A  
San José, CA 95112  
(408)998-6015 Fax: (408)971-4880

**NVLAP**

**Charge Report**  
**07/01/2004 to 05/22/2005**

**Monday, May 23, 2005**  
**Page 1 of 1**

**Charge #:** 001162710  
**File #:** SLURRY04

**Project Description:** Slurry Seal 2001  
**Project Name:** Slurry Seal 2004

<u>Work Code</u>	<u>Description</u>	<u>Overhead Rate:</u> 1.75	<u>Hourly Cost</u>	<u>Total Hours</u>	<u>Total Cost</u>
	Paid Absence		\$87.18	1.0	\$87.18
	Safety		\$78.50	2.0	\$157.00
	Slurry Seal		\$52.15	42.0	\$2,190.40
	Equipment Maintenance		\$78.50	4.0	\$314.00
	Prepare Materials Test Report		\$78.50	9.0	\$706.50
	Training		\$68.68	4.0	\$274.72
	Administration		\$83.78	18.0	\$1,508.12
	Pavement Design (Field Work)		\$75.32	4.0	\$301.28
	Administration		\$103.40	2.0	\$206.80
	Penetration		\$48.80	3.0	\$146.40
	Penetration		\$52.85	3.0	\$158.56
	Wet Track Abrasion		\$69.84	4.0	\$279.36
	Emulsion-Residue By Evaporation		\$48.80	1.0	\$48.80
	Emulsion-Saybolt Furol Viscosity		\$48.80	2.0	\$97.60
	Emulsion-Saybolt Furol Viscosity		\$60.96	1.0	\$60.96
	Emulsion-Residue By Distillation		\$58.53	5.0	\$292.64
	Emulsion-Residue By Distillation		\$60.96	1.0	\$60.96
	Slurry Seal (Wet Track Abrasion)		\$72.58	8.0	\$580.64
	Softening Point		\$48.80	6.0	\$292.80
	Softening Point		\$54.88	4.0	\$219.52
	Equipment Maintenance		\$55.29	7.5	\$414.64
	Computer Work		\$68.14	2.0	\$136.28
	Administration		\$75.25	15.0	\$1,128.88
	Thermometers (12 Each)		\$60.96	4.0	\$243.84
	Miscellaneous Lab Testing and Support		\$78.50	8.0	\$628.00
<b>File # Totals:</b>			<b>\$65.64</b>	<b>160.5</b>	<b>\$10,535.68</b>

**Charge # Totals:** \$65.64 160.5 \$10,535.68

# Project Support



# SJIA North Concourse



## Key Challenges:

- Substitution of shotcrete shoring vs. wood lagging shoring without QC/QA specifications.

## Support Services:

- QC/QA plan for shotcrete performance requirements.
- Performed compressive strength testing for shotcrete.

# Civic Plaza/Fifth Street Streetscape



## Key Challenges:

- Concrete pavement design.
- Anticipated saturated subbase.
- Lime treated base design without trial batching.

## Support Services:

- Timely pavement design.
- The percent lime for soil was based on past experience.

# SJIA Runway 30L Extension, 2004



## Key Challenges:

- Accelerated project schedule.
- Stringent FAA materials requirements.
- Inaccurate soil profiles at both ends of runway, and structurally inadequate soil at these locations.

## Support Services:

- Dedicated project team. Added resources as required.
- Day and night work.
- Engineer's Materials Report for FAA approval.
- LTB mix design in lieu of aggregate base saved time and money.



# San José Grand Prix



## Key Challenges:

- Aggressive design schedule.
- Relocation of race track from Santa Clara St. to Almaden Blvd.
- Mix design (race track vs. standard mix).

## Support Services:

- Evaluated existing pavement condition.
- Partnered with HMA supplier to provide a durable mix design.
- Provided quality assurance tests for specified HMA material.

# Almaden and Cambrian Branch Libraries



## Key Challenges:

- Consultant specified design based on non-representative field soil samples.
- Soil cement treated base proposed.

## Support Provided:

- Lab determination of existing soil properties and theoretical soil density.
- Field inspection and testing of soil cement installation with one day notice.



# MTL Customers



- **Public Works Department**

City Facilities Architectural Services

Engineering and Construction Services

Transportation and Development Services

- **Department of Transportation**

Infrastructure Maintenance Div.

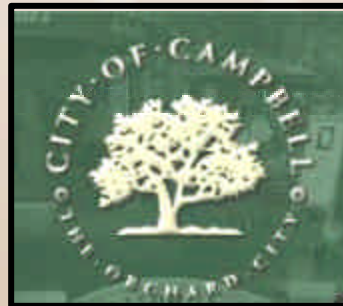
- **Environmental Services Department**

Water Pollution Control Plant

San Jose Municipal Water



**San José International  
Airport Master Plan Team**

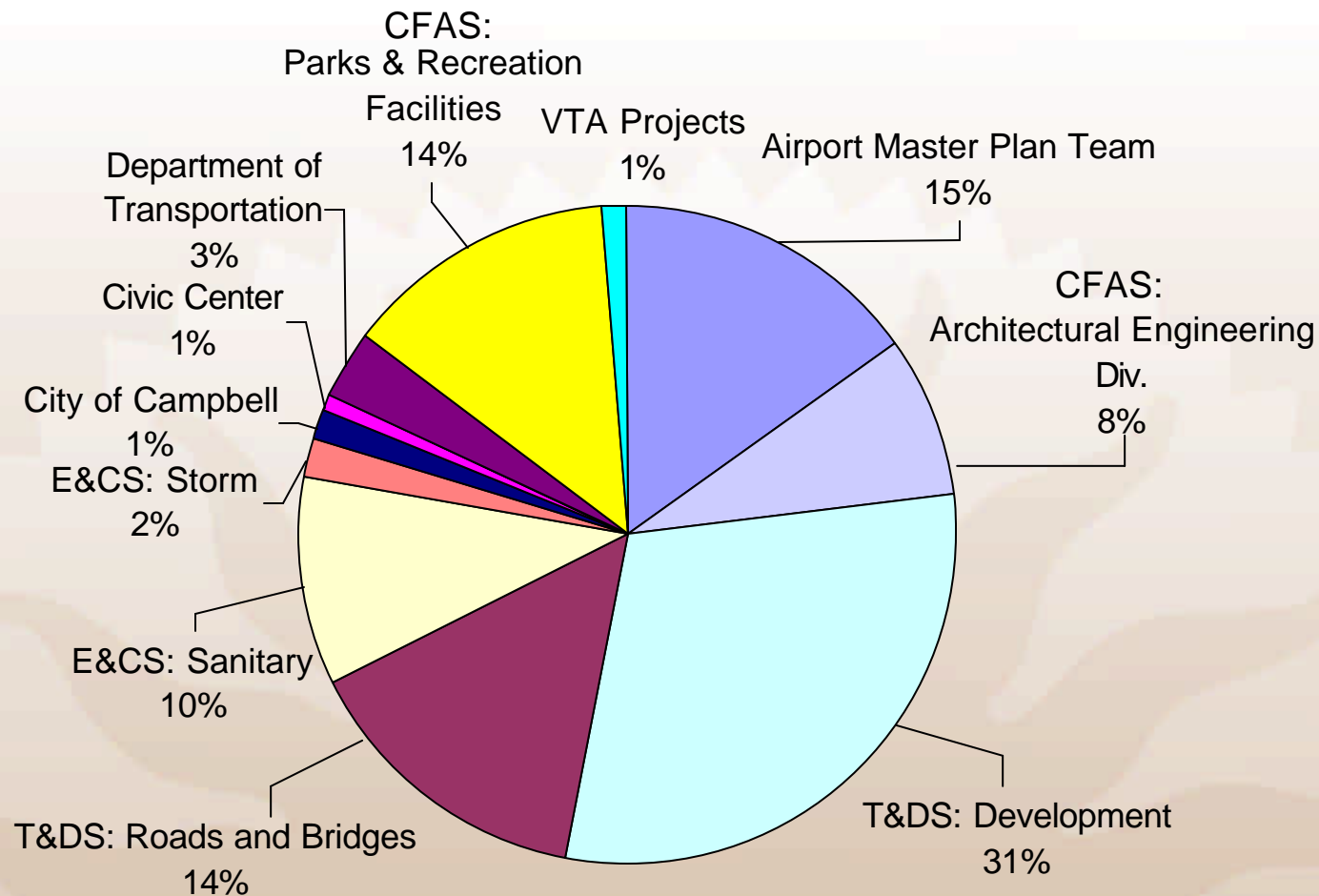


**City Of Campbell**



**Valley Transportation  
Authority**

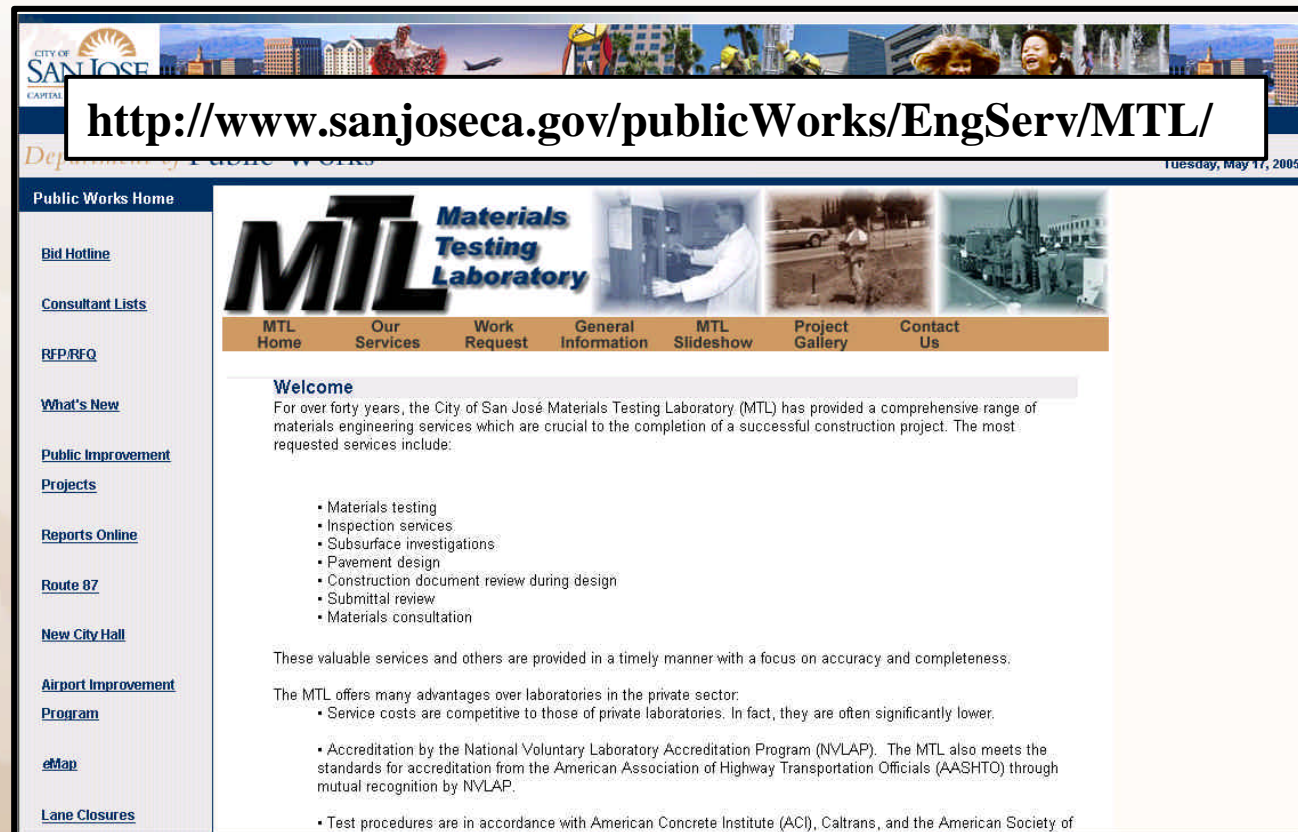
# Workload Distribution (FY 04-05)



# Customer Service

# MTL Website

The MTL maintains a web site to provide its customers with information about its services, accreditations, and test procedures.




# MTL Work Request Form

Download from our website

(<http://www.sanjoseca.gov/publicWorks/EngServ/MTL/instructions.asp>)

OR the City Intranet (<http://pw.csj.gov/resources/forms/>)

MATERIALS TESTING LABORATORY (MTL) WORK REQUEST		
		FILE # <input type="text"/>
REQUESTED BY: <input type="text"/>		CHARGE # <input type="text"/>
DEPT/DIV/SEC: <input type="text"/>		EXT. <input type="text"/>
PROJECT: <input type="text"/>		
<input checked="" type="radio"/> Routine (Completed in 10 working days)		
<input type="radio"/> Priority (Completed in less than 10 working days. <i>MTL overtime authorized if necessary.</i> )		
Date needed (priority requests only): <input type="text"/> MM/DD/YY		
<b>Geotechnical Services</b>		<b>Construction Services</b>
<input type="checkbox"/> Pavement Design		<input type="checkbox"/> Plan/Specification Review
<input type="checkbox"/> Pavement Overlay Design		<input type="checkbox"/> Material Submittal Review
<input type="checkbox"/> Pavement Thickness Determination		<input type="checkbox"/> Pipe Inspection/Testing
<input type="checkbox"/> Geotechnical Plan/Specification Review		<input type="checkbox"/> A.C./P.C.C. Coring
<input type="checkbox"/> Soils Log of Boring Report		<input type="checkbox"/> Treated Base Design/Inspection/Testing
<input type="checkbox"/> Cost Estimate		<input type="checkbox"/> Cost Estimate
<input type="checkbox"/> Other <input type="text"/>		<input type="checkbox"/> Other <input type="text"/>
<b>REMARKS / SPECIAL INSTRUCTIONS</b>		
<input type="text"/>		
<b>GEOTECHNICAL INFORMATION</b>		
STREET / LOCATION	TRAFFIC INDEX**	DEPTH OF BORINGS**
1 <input type="text"/>	<input type="text"/>	<input type="text"/>
2 <input type="text"/>	<input type="text"/>	<input type="text"/>
3 <input type="text"/>	<input type="text"/>	<input type="text"/>
<b>MTL USE ONLY</b>		
Received by: <input type="text"/> Assigned to: <input type="text"/> Completed: <input type="text"/>		
a.m./p.m.		



# In Summary

# To Ensure Quality Projects, The MTL

- ... Performs materials testing, inspection and engineering services to ensure quality construction materials.**
- ... Provides accredited and timely test results.**
- ... Will meet or beat the prices of private laboratories and carefully monitors project charges.**
- ... Is able to overcome materials engineering challenges presented by a wide range of projects.**
- ... Serves customers including the City of San José, the City of Campbell, and the Valley Transportation Authority.**
- ... Maintains a web site for customer accessibility and service information.**



**For Materials Testing Laboratory Services,  
Call Us At:  
(408) 998-6015**

**City of San José Materials Testing Laboratory  
1661 Senter Road, Bldg. A, 1<sup>st</sup> Floor  
San Jose, CA 95112**

**<http://www.sanjoseca.gov/publicWorks/EngServ/MTL/>**